



FAA-C-2256a

April 21, 1972

~~SUPERSEDED~~

FAA-C-2256, 4/14/66

# ~~DEPARTMENT OF TRANSPORTATION~~ FEDERAL AVIATION ADMINISTRATION SPECIFICATION

## ~~TEMPERATURE~~ AND HUMIDITY CONTROL EQUIPMENT

### 1. SCOPE

1.1 Scope.- This specification covers the requirements and installation of temperature/humidity control equipment in FM remote facilities. This includes ventilating and unitary air-conditioning equipment, their respective control systems, and ancillary components of the temperature/humidity control system.

### 2. APPLICABLE DOCUMENTS

2.1 FAA documents.- The following FAA specification and drawings, of the issues specified in the invitation for bids or request for proposals, form a part of this specification and are applicable to the extent specified herein.

#### 2.1.1 FAA specification

FAA-C-1217                      Electrical Work, Interior

2.1.2 FAA drawings.- Applicable drawings will be furnished with the invitation for bids or request for proposals.

2.2 Military specification.- The following Military specification of the issue in effect specified in the invitation for bids or request for proposals, form a part of this specification and are applicable to the extent specified herein.

MIL-C-45662

Calibration System Requirements

2.3 Industry publications.- The following publications, of the issues in effect on the date of invitation for bids or request for proposals, form a part of this specification and are applicable to the extent specified herein.

American National Standards  
Institute ANSI B9.1

American Standard Safety Code  
for Mechanical Refrigeration

Air-Conditioning and  
Refrigeration Institute  
Standard Nos. 210 and 260

Standard for Unitary Air-  
Conditioning Equipment

Standard for Application,  
Installation and Servicing  
of Unitary Systems

Air Moving and Conditioning  
Association Standard No. 210

Standard Test Code for  
Air Moving Devices

American Society of Heating,  
Refrigerating and Air-Conditioning  
Engineers Guide and Data Book

Systems Volume, Equipment  
Volume, Applications Volume  
and Handbook of Fundamentals

Association of Home Appliances  
Manufacturers Publication No. CN-1

Room Air Conditioner

American Society for Testing and  
Materials (ASTM)

E 84 Method of Test for  
Surface Burning Characteristics  
of Building Materials

(Copies of this specification and other applicable FAA documents may be obtained from the Contracting Officer in the Federal Aviation Administration office issuing the invitation for bids or request for proposals. Requests should fully identify material desired, i.e., specification number and dates. Requests should cite the invitation for bids, request for proposals, or the contract involved or other use to be made of the requested material.)

(Single copies of Military specifications may be requested by mail or telephone from U. S. Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa. 19120 (for telephone requests call 215-697-3321, 8:00 a.m. to 6:30 p.m. Monday through Friday). Not more than five items may be ordered on a single request; the invitation for bid or contract number should be cited where applicable. Only latest revisions (complete with latest amendments) are available. Request all items by document number. For information on subscription service, direct inquiries to the above address with additional marking ATTN: Code 56, or telephone 215-697-2179, Inquiry Desk.)

2.2 Military specification.- The following Military specification of the issue in effect specified in the invitation for bids or request for proposals, form a part of this specification and are applicable to the extent specified herein.

MIL-C-45662

Calibration System Requirements

2.3 Industry publications.- The following publications, of the issues in effect on the date of invitation for bids or request for proposals, form a part of this specification and are applicable to the extent specified herein.

American National Standards  
Institute ANSI B9.1

American Standard Safety Code  
for Mechanical Refrigeration

Air-Conditioning and  
Refrigeration Institute  
Standard Nos. 210 and 260

Standard for Unitary Air-  
Conditioning Equipment

Standard for Application,  
Installation and Servicing  
of Unitary Systems

Air Moving and Conditioning  
Association Standard No. 210

Standard Test Code for  
Air Moving Devices

American Society of Heating,  
Refrigerating and Air-Conditioning  
Engineers Guide and Data Book

Systems Volume, Equipment  
Volume, Applications Volume  
and Handbook of Fundamentals

Association of Home Appliances  
Manufacturers Publication No. CN-1

Room Air Conditioner

American Society for Testing and  
Materials (ASTM)

E 84 Method of Test for  
Surface Burning Characteristics  
of Building Materials

(Copies of this specification and other applicable FAA documents may be obtained from the Contracting Officer in the Federal Aviation Administration office issuing the invitation for bids or request for proposals. Requests should fully identify material desired, i.e., specification number and dates. Requests should cite the invitation for bids, request for proposals, or the contract involved or other use to be made of the requested material.)

(Single copies of Military specifications may be requested by mail or telephone from U. S. Naval Supply Depot, 5801 Tabor Ave., Philadelphia, Pa. 19120 (for telephone requests call 215-697-3321, 8:00 a.m. to 6:30 p.m. Monday through Friday). Not more than five items may be ordered on a single request; the invitation for bid or contract number should be cited where applicable. Only latest revisions (complete with latest amendments) are available. Request all items by document number. For information on subscription service, direct inquiries to the above address with additional marking ATTN: Code 56, or telephone 215-697-2179, Inquiry Desk.)

The capacity shall not be less than that required on the drawing. When specified on the drawing, the equipment shall be supplied with an electric heating coil of the capacity indicated on the drawing. The air-conditioning system shall be equipped with an outdoor air intake, mixing box, and outdoor and return air dampers with necessary controls. The equipment shall be air-cooled with all elements of the refrigerant circuit properly interconnected with the refrigerant piping. The equipment shall be complete with weatherproof cabinet, air-cooled refrigeration circuit, condensate drain pan, evaporator fan motor and drive, and all other appurtenances required for a complete system. Filters shall be provided with the unit cabinet, or in the ductwork associated with the equipment, as indicated on the drawings and in accordance with **ARI 260**, arranged to filter all outdoor and return air. The system shall be capable of supplying from zero to **100** per cent outside air to the conditioned space when an outdoor air intake is specified. The system shall be designed, constructed, and assembled in accordance with the applicable requirements of ANSI **B9.1**.

**3.2.1 Cabinet.**-- All surfaces of the cabinet shall be constructed of corrosion resistant material or material suitably treated to resist corrosion encountered in exterior exposure under normal weather conditions. All interior surfaces of the cabinet through which conditioned air passes shall be insulated with a material having a "k" factor of not greater than **0.25** BTU per (hour)(square foot)(**Fahrenheit** degree per inch thickness) at a **75°F** mean temperature. The air side surfaces of the insulation shall be coated to prevent erosion by the passage of air. Removable panel(s) in the enclosure shall provide easy access to all parts for lubrication, servicing, or removal of components.

**3.2.2 Refrigeration compressor.**-- The refrigeration compressor(s) shall be of the hermetic or semi-hermetic type. Semi-hermetic compressors shall be provided with crankcase heaters and an oil level sight glass. Hermetic compressors without internal anti-slugging protection shall be provided with a crankcase heater. The contractor shall furnish and install charging valves at the compressor-condenser unit(s) on both the refrigerant liquid and suction lines. Charging valves shall be line size on the run with suitable reducing fittings on the branch to facilitate the use of standard **1/4** inch connections for attaching refrigerant gauges. Refrigerant used shall be refrigerant **12** or **22**.

**3.2.3 Air-cooled condenser.**-- The air-cooled condenser shall be suitable for either remote installation in a weather protected cabinet or an integral part of the condensing unit fully enclosed within the unit housing as required on the applicable drawings. The air-cooled condenser shall be a complete factory-fabricated and -assembled **unit** consisting of coils, fans, and electric motor drive. The sizing of the condenser for full capacity at design conditions will be based on a **20 to 25** degree **F.** temperature difference between the entering outside air

The capacity shall not be less than that required on the drawing. When specified on the drawing, the equipment shall be supplied with an electric heating coil of the capacity indicated on the drawing. The air-conditioning system shall be equipped with an outdoor air intake, mixing box, and outdoor and return air dampers with necessary controls. The equipment shall be air-cooled with all elements of the refrigerant circuit properly interconnected with the refrigerant piping. The equipment shall be complete with weatherproof cabinet, air-cooled refrigeration circuit, condensate drain pan, evaporator fan motor and drive, and all other appurtenances required for a complete system. Filters shall be provided with the unit cabinet, or in the ductwork associated with the equipment, as indicated on the drawings and in accordance with **ARI 260**, arranged to filter all outdoor and return air. The system shall be capable of supplying from zero to **100** per cent outside air to the conditioned space when an outdoor air intake is specified. The system shall be designed, constructed, and assembled in accordance with the applicable requirements of ANSI **B9.1**.

**3.2.1 Cabinet.**-- All surfaces of the cabinet shall be constructed of corrosion resistant material or material suitably treated to resist corrosion encountered in exterior exposure under normal weather conditions. All interior surfaces of the cabinet through which conditioned air passes shall be insulated with a material having a "k" factor of not greater than **0.25** BTU per (hour)(square foot)(~~Fahrenheit~~ degree per inch thickness) at a **75°F** mean temperature. The air side surfaces of the insulation shall be coated to prevent erosion by the passage of air. Removable panel(s) in the enclosure shall provide easy access to all parts for lubrication, servicing, or removal of components.

**3.2.2 Refrigeration compressor.**-- The refrigeration compressor(s) shall be of the hermetic or semi-hermetic type. Semi-hermetic compressors shall be provided with crankcase heaters and an oil level sight glass. Hermetic compressors without internal anti-slugging protection shall be provided with a crankcase heater. The contractor shall furnish and install charging valves at the compressor-condenser unit(s) on both the refrigerant liquid and suction lines. Charging valves shall be line size on the run with suitable reducing fittings on the branch to facilitate the use of standard **1/4** inch connections for attaching refrigerant gauges. Refrigerant used shall be refrigerant **12** or **22**.

**3.2.3 Air-cooled condenser.**-- The air-cooled condenser shall be suitable for either remote installation in a weather protected cabinet or an integral part of the condensing unit fully enclosed within the unit housing as required on the applicable drawings. The air-cooled condenser shall be a complete factory-fabricated and -assembled **unit** consisting of coils, fans, and electric motor drive. The sizing of the condenser for full capacity at design conditions will be based on a **20 to 25** degree **F.** temperature difference between the entering outside air

**3.2.6 Filter-drier.**— A refrigerant filter-drier shall be installed in the refrigerant liquid line, upstream of and as close as practical to the expansion or solenoid valve.

**3.2.6.1 Liquid and moisture indicator.**— A liquid and moisture indicator shall be installed between the filter-drier and the expansion or solenoid valve.

**3.2.7 Refrigerant piping and charge.**— All components of the refrigeration system shall be interconnected at the factory with refrigerant piping (copper tubing). After interconnection, the circuit shall be dehydrated, evacuated, and charged with the operating charge of refrigerant and lubricating oil at the factory. The entire system shall be evacuated to 0.04 inches of mercury absolute (1000 microns). Where more than one factory-made assembly is utilized, e.g., separated evaporator, condenser and compressor assemblies, the refrigerant suction line shall be insulated with 1/2 thick "Fiberglass" O-C flexible tubing, or equal with thermal conductivity not greater than 0.30 Btu/HR/FT<sup>2</sup>/In/°F.

**3.2.8 Fans.**— The fans shall be either centrifugal or propeller type as required in 3.2.8.1 or 3.2.8.2. Fans shall be directly connected to the motor shaft or indirectly connected to the motor by a V-belt drive. Belt drives shall be completely enclosed within the unit casing or provided with a guard and adjustable sheaves to provide not less than 20 percent fan-speed adjustment. The sheaves shall be selected to provide the capacity indicated at the approximate midpoint of the adjustment. The fan motor shall be provided with a magnetic starter having thermal overload protection and shall be of the manual or automatic reset type.

**3.2.8.1 Evaporator fan.**— The evaporator fan for the air conditioning unit shall be of the centrifugal, multiblade type with a capacity not less than that indicated on the drawing and shall be in accordance with paragraph 3.2.8.

**3.2.9 Air filters.**— Air filters shall be the throw-away type, (not less than) 1 inch thick. Filter face velocity shall not be greater than that recommended by the filter manufacturer for the application.

**3.3 Roof mounted unit.**— The roof mounted unit shall be equipped with supply and return air duct connections at either the bottom, side, or end of the unit. Supply and return air shall be fed to and returned from a combination supply and return air diffuser mounted in the ceiling or below the roof joists of the conditioned space when specified on the applicable drawing. When a combination diffuser is specified, the return duct shall be located inside the supply duct and the interface shall be insulated. All roof openings shall be flashed and sealed to afford a watertight installation. The unit shall be suitable for rigging into place on the roof either by use of rigging lugs provided with the unit or slings placed underneath the unit.

**3.2.6 Filter-drier.**— A refrigerant filter-drier shall be installed in the refrigerant liquid line, upstream of and as close as practical to the expansion or solenoid valve.

**3.2.6.1 Liquid and moisture indicator.**— A liquid and moisture indicator shall be installed between the filter-drier and the expansion or solenoid valve.

**3.2.7 Refrigerant piping and charge.**— All components of the refrigeration system shall be interconnected at the factory with refrigerant piping (copper tubing). After interconnection, the circuit shall be dehydrated, evacuated, and charged with the operating charge of refrigerant and lubricating oil at the factory. The entire system shall be evacuated to 0.04 inches of mercury absolute (1000 microns). Where more than one factory-made assembly is utilized, e.g., separated evaporator, condenser and compressor assemblies, the refrigerant suction line shall be insulated with 1/2 thick "Fiberglass" O-C flexible tubing, or equal with thermal conductivity not greater than 0.30 Btu/HR/FT<sup>2</sup>/In/°F.

**3.2.8 Fans.**— The fans shall be either centrifugal or propeller type as required in 3.2.8.1 or 3.2.8.2. Fans shall be directly connected to the motor shaft or indirectly connected to the motor by a V-belt drive. Belt drives shall be completely enclosed within the unit casing or provided with a guard and adjustable sheaves to provide not less than 20 percent fan-speed adjustment. The sheaves shall be selected to provide the capacity indicated at the approximate midpoint of the adjustment. The fan motor shall be provided with a magnetic starter having thermal overload protection and shall be of the manual or automatic reset type.

**3.2.8.1 Evaporator fan.**— The evaporator fan for the air conditioning unit shall be of the centrifugal, ~~multiblade~~ type with a capacity not less than that indicated on the drawing and shall be in accordance with paragraph 3.2.8.

**3.2.9 Air filters.**— Air filters shall be the throw-away type, (not less than) 1 inch thick. Filter face velocity shall not be greater than that recommended by the filter manufacturer for the application.

**3.3 Roof mounted unit.**— The roof mounted unit shall be equipped with supply and return air duct connections at either the bottom, side, or end of the unit. Supply and return air shall be fed to and returned from a combination supply and return air diffuser mounted in the ceiling or below the roof joists of the conditioned space when specified on the applicable drawing. When a combination diffuser is specified, the return duct shall be located inside the supply duct and the interface shall be insulated. All roof openings shall be flashed and sealed to afford a watertight installation. The unit shall be suitable for rigging into place on the roof either by use of rigging lugs provided with the unit or slings placed underneath the unit.

**3.2.6 Filter-drier.**— A refrigerant filter-drier shall be installed in the refrigerant liquid line, upstream of and as close as practical to the expansion or solenoid valve.

**3.2.6.1 Liquid and moisture indicator.**— A liquid and moisture indicator shall be installed between the filter-drier and the expansion or solenoid valve.

**3.2.7 Refrigerant piping and charge.**— All components of the refrigeration system shall be interconnected at the factory with refrigerant piping (copper tubing). After interconnection, the circuit shall be dehydrated, evacuated, and charged with the operating charge of refrigerant and lubricating oil at the factory. The entire system shall be evacuated to 0.04 inches of mercury absolute (1000 microns). Where more than one factory-made assembly is utilized, e.g., separated evaporator, condenser and compressor assemblies, the refrigerant suction line shall be insulated with 1/2 thick "Fiberglass" O-C flexible tubing, or equal with thermal conductivity not greater than 0.30 Btu/HR/FT<sup>2</sup>/In/°F.

**3.2.8 Fans.**— The fans shall be either centrifugal or propeller type as required in 3.2.8.1 or 3.2.8.2. Fans shall be directly connected to the motor shaft or indirectly connected to the motor by a V-belt drive. Belt drives shall be completely enclosed within the unit casing or provided with a guard and adjustable sheaves to provide not less than 20 percent fan-speed adjustment. The sheaves shall be selected to provide the capacity indicated at the approximate midpoint of the adjustment. The fan motor shall be provided with a magnetic starter having thermal overload protection and shall be of the manual or automatic reset type.

**3.2.8.1 Evaporator fan.**— The evaporator fan for the air conditioning unit shall be of the centrifugal, ~~multiblade~~ type with a capacity not less than that indicated on the drawing and shall be in accordance with paragraph 3.2.8.

**3.2.9 Air filters.**— Air filters shall be the throw-away type, (not less than) 1 inch thick. Filter face velocity shall not be greater than that recommended by the filter manufacturer for the application.

**3.3 Roof mounted unit.**— The roof mounted unit shall be equipped with supply and return air duct connections at either the bottom, side, or end of the unit. Supply and return air shall be fed to and returned from a combination supply and return air diffuser mounted in the ceiling or below the roof joists of the conditioned space when specified on the applicable drawing. When a combination diffuser is specified, the return duct shall be located inside the supply duct and the interface shall be insulated. All roof openings shall be flashed and sealed to afford a watertight installation. The unit shall be suitable for rigging into place on the roof either by use of rigging lugs provided with the unit or slings placed underneath the unit.



set horizontal and one set vertical. Net free area of the grilles with all vanes fully open shall be not less than 70 per cent.

3.9 Relief air louver-dampers.- The relief air louver-dampers shall be of the motor-operated or gravity relief, parallel-blade type as required on the applicable drawings. Louver-dampers shall be constructed of galvanized steel or anodized aluminum, equipped with vinyl strips on blade tips and shall close tightly when outdoor air intake dampers of the ventilating or air conditioning system close.

3.10 Fixed weather-proof louvers.- The fixed weather-proof louvers shall be installed as required on the applicable drawings. Louvers shall be constructed of galvanized steel or anodized aluminum, weatherproof to a face velocity of 650 feet per minute for both free falling rain and with water, running down a wall, passing over the face of the louver.

3.11 Automatic temperature control system.- The control system shall operate as required on the applicable drawings and shall include all thermostats, wire, conduit or metallic tubing, dampers, and damper motors required to maintain the conditions described and detailed on the drawings. The system shall operate electrically. Control dampers shall be of the proportioning type, with each adjacent blade rotating in the opposite direction. Damper motors shall be of the electrically driven, spring-return type.

3.11.1 Installation of controls.- Control wiring shall be not smaller than No. 18 AWG with 600 volt insulation and installed in rigid conduit or metallic tubing. All control power shall originate on the load side of the heating-ventilating or air conditioning unit as applicable. All control wiring shall be installed in accordance with the applicable requirements of Specification FAA-C-12217.

3.12 Noise level limits.- The noise levels generated shall not exceed the limits shown in the following table with first the air conditioning and then the ventilation system in full operation. All supply and return air grilles shall be in position and properly aligned for air flow. Sound level readings shall be taken at the point of the highest noise level at a distance of five feet from the exterior surface of the equipment with other noise producing equipment in the facility not in operation. Ventilation systems shall be checked in both the zero and 100 per cent outdoor air modes of operation. Calibration shall be in accordance with paragraph 4.1.1. Noise limits are expressed in db with a reference pressure of 0.0002 microbar (dynes per square centimeter).

set horizontal and one set vertical. Net free area of the grilles with all vanes fully open shall be not less than 70 per cent.

3.9 Relief air louver-dampers.- The relief air louver-dampers shall be of the motor-operated or gravity relief, parallel-blade type as required on the applicable drawings. Louver-dampers shall be constructed of galvanized steel or anodized aluminum, equipped with vinyl strips on blade tips and shall close tightly when outdoor air intake dampers of the ventilating or air conditioning system close.

3.10 Fixed weather-proof louvers.- The fixed weather-proof louvers shall be located as required on the applicable drawings. Louvers shall be constructed of galvanized steel or anodized aluminum, weatherproof to a face velocity of 650 feet per minute for both free falling rain and with water, running down a wall, passing over the face of the louver.

3.11 Automatic temperature control system.- The control system shall operate as required on the applicable drawings and shall include all thermostats, wire, conduit or metallic tubing, dampers, and damper motors required to maintain the conditions described and detailed on the drawings. The system shall operate electrically. Control dampers shall be of the proportioning type, with each adjacent blade rotating in the opposite direction. Damper motors shall be of the electrically driven, spring-return type.

3.11.1 Installation of controls.- Control wiring shall be not smaller than No. 18 AWG with 600 volt insulation and installed in rigid conduit or metallic tubing. All control power shall originate on the load side of the heating-ventilating or air conditioning unit as applicable. All control wiring shall be installed in accordance with the applicable requirements of Specification FAA-C-12217.

3.12 Noise level limits.- The noise levels generated shall not exceed the limits shown in the following table with first the air conditioning and then the ventilation system in full operation. All supply and return air grilles shall be in position and properly aligned for air flow. Sound level readings shall be taken at the point of the highest noise level at a distance of five feet from the exterior surface of the equipment with other noise producing equipment in the facility not in operation. Ventilation systems shall be checked in both the zero and 100 per cent outdoor air modes of operation. Calibration shall be in accordance with paragraph 4.1.1. Noise limits are expressed in db with a reference pressure of 0.0002 microbar (dynes per square centimeter).

6.1.1 Ordering data.- Invitation for bids and contract should specify the following:

- (a) Applicable facility drawings as well as any secondary or reference drawings.
- (b) items to be Government furnished.
- (4) ~~me,~~ electrical characteristics and capacity of air conditioning unit where required.
- ((d) Electrical characteristics and capacity of the ventilating unit.
- ((e) Heating equipment required including heating design temperature.
- ((f) Outdoor air intake requirement for air conditioning equipment.

6.1.2 Warranty.- The contractor should obtain a five year factory warranty on the compressor and coils and transfer this warranty to the Government.

6.1.3 Quality control.- Should the project warrant, this specification shall be amended to include all or part of the quality control program requirements set forth in FAA Standard ~~FAA-STD-013.~~

\* \* \* \* \*

6.1.1 Ordering data.- Invitation for bids and contract should specify the following:

- (a) Applicable facility drawings as well as any secondary or reference drawings.
- (b) items to be Government furnished.
- (4) ~~me,~~ electrical characteristics and capacity of air conditioning unit where required.
- (d) Electrical characteristics and capacity of the ventilating unit.
- (e) Heating equipment required including heating design temperature.
- (f) Outdoor air intake requirement for air conditioning equipment.

6.1.2 Warranty.- The contractor should obtain a five year factory warranty on the compressor and coils and transfer this warranty to the Government.

6.1.3 Quality control.- Should the project warrant, this specification shall be amended to include all or part of the quality control program requirements set forth in FAA Standard ~~FAA-STD-013.~~

\* \* \* \* \*